WHAT IS CLAIMED IS:

1   1.   A read channel, comprising:

2   a Viterbi decoder for decoding a received data stream to produce an estimated

3   sequence representing decoded data bits; and

4   a sequence selection stage for analyzing error events and selecting a sequence

5   based upon the analysis of the error events;

6   wherein the sequence selection stage and the Viterbi decoder each include at least

7   one threshold, and wherein at least one threshold of the sequence selection stage and the

8   Viterbi decoder is dynamically biased to improve detection reliability in the presence of

9   data dependent noise.

1   2.   The read channel of claim 1 further comprising an equalizer for receiving

2   a readback signal and producing a desired target response at the Viterbi decoder.

1   3.   The read channel of claim 1, wherein the Viterbi decoder further

2   comprises:

3   a branch metric generator for generating distance metrics for a received data

4   stream;

5   a plurality of adders for adding the distance metric for each possible branch to a

6   previously accumulated path metric to produce a revised path metric for each branch;

7   at least one comparator for comparing the revised path metric for a plurality of

8   branches; and

9   a selector for selecting a path metric for a path having a smallest path metric.

1   4.   The read channel of claim 3, wherein the at least one comparator includes

2   a threshold for making a bias adjustment to improve detection reliability in the presence

3   of data dependent noise.

1   5.   The read channel of claim 4, wherein the threshold is adjusted to choose a

2   sequence with more transitions.

1   6.   The read channel of claim 4, wherein the threshold is adjusted to choose a

2   sequence that compensates for polarity dependent noise.

1   7.   The read channel of claim 6, wherein the threshold is adjusted to choose a

2   sequence with more ones when polarity dependent noise makes ones more noisy.

1   8.   The read channel of claim 6, wherein the threshold is adjusted to choose a

2   sequence with more zeroes when polarity dependent noise makes zeroes more noisy.

1   9.   The read channel of claim 1, wherein the sequence selection stage further

2   comprises:

3   a plurality of error event filters, operatively coupled to the Viterbi decoder, for

4   identifying an error event and producing an output error;

5   a plurality of adders, coupled to the error event filters, for combining the output

6   error with an offset term specific for each error event filter to produce an error sequence;

7   and

8   a selector for deciding on one error sequence from the plurality of adders.

1   10.   The read channel of claim 9, wherein each of the offset terms comprise a

2   threshold, each of the thresholds being adjusted to improve detection reliability in the

3   presence of data dependent noise.

1   11.   The read channel of claim 10, wherein the offset terms comprising a

2   threshold are made dependent upon the sequence at the output of the Viterbi decoder.

1   12.   The read channel of claim 11, wherein the offset terms comprising a

2   threshold are adjusted to choose a sequence with more transitions.

1   13.   The read channel of claim 11, wherein the offset terms comprising a

2 threshold are adjusted to choose a sequence that compensates for polarity dependent

3 noise.

1   14.   The read channel of claim 13, wherein the threshold is adjusted to choose

2 a sequence with more ones when polarity dependent noise makes ones more noisy.

1   15.   The read channel of claim 13, wherein the threshold is adjusted to choose

2 a sequence with more zeroes when polarity dependent noise makes zeroes more noisy.

1   16.   A signal processing system for providing read channel functions,

2 comprising:

3   a memory for storing data therein; and

4   a processor, coupled to the memory, the processor configured for decoding a

5 received data stream to produce an estimated sequence representing decoded data bits, for

6 analyzing error events and for selecting a sequence based upon the analysis of the error

7 events;

8   wherein the processor includes at least one threshold, and wherein at least one

9 threshold is dynamically biased to improve detection reliability in the presence of data

10 dependent noise.

1   17.   The signal processing system of claim 16, wherein the processor is further

2   configured for receiving a readback signal and producing a desired equalized target

3   response at the Viterbi decoder.

1   18.   The signal processing system of claim 16, wherein the processor is further

2   configured for adding the distance metric for each possible branch to a previously

3   accumulated path metric to produce a revised path metric for each branch, for comparing

4   the revised path metric for a plurality of branches and for selecting a path metric for a

5   path having a smallest path metric.

1   19.   The signal processing system of claim 18, wherein the processor adjusts

2   the comparing based upon adjustment of the threshold to improve detection reliability in

3   the presence of data dependent noise.

1   20.   The signal processing system of claim 19, wherein the threshold is

2   adjusted to choose a sequence with more transitions.

1   21.   The signal processing system of claim 19, wherein the threshold is

2   adjusted to choose a sequence that compensates for polarity dependent noise.

1   22.   The signal processing system of claim 21, wherein the threshold is

2   adjusted to choose a sequence with more ones when polarity dependent noise makes ones

3   more noisy.

1   23.   The signal processing system of claim 21, wherein the threshold is

2   adjusted to choose a sequence with more zeroes when polarity dependent noise makes

3   zeroes more noisy.

1   24.   The signal processing system of claim 16, wherein the processor is further

2   configured for adjusting error events with an offset term to produce an error sequence and

3   for deciding on one error sequence based on adjustment offset term.

1   25.   The signal processing system of claim 24, wherein the offset terms

2   comprise a threshold, each of the thresholds being adjusted to improve detection

3   reliability in the presence of data dependent noise.

1   26.   The signal processing system of claim 25, wherein the offset terms

2   comprising a threshold are made dependent upon the estimated sequence.

1   27.   The signal processing system of claim 26, wherein the offset terms

2   comprising a threshold are adjusted to choose a sequence with more transitions.

1   28.   A signal processor configured for performing read channel operations,

2   wherein the signal processor decoding a received data stream to produce an estimated

3   sequence representing decoded data bits, analyzing error events and selecting a sequence

4   based upon the analysis of the error events based upon a chosen threshold, wherein the

5   threshold is dynamically biased to improve detection reliability in the presence of data

6   dependent noise.

1   29.   A data storage system, comprising:

2   at least one storage medium for storing data thereon;

3   a motor for moving the at least one storage medium;

4   a transducer, operatively coupled to the at least one storage medium, for reading

5 and writing data on the at least one storage medium;

6   an actuator, coupled to the transducer, for translating the transducer relative to the

7 at least one storage medium; and

8   a read channel for processing a data stream received via the transducer, the read

9 channel further comprising:

10   a Viterbi decoder for decoding a received data stream to produce an

11 estimated sequence representing decoded data bits; and

12   a sequence selection stage for analyzing error events and selecting a

13 sequence based upon the analysis of the error events;

14   wherein the sequence selection stage and the Viterbi decoder each include

15 at least one threshold, and wherein at least one of the threshold of the sequence selection

16 stage and the Viterbi decoder is dynamically biased to improve detection reliability in the

17 presence of data dependent noise.

1   30.   The data storage system of claim 29 further comprising an equalizer for

2 receiving a readback signal and producing a desired target response at the Viterbi

3 decoder.

1   31.   The data storage system of claim 29, wherein the Viterbi decoder further

2   comprises:

3   a branch metric generator for generating distance metrics for a received data

4   stream;

5   a plurality of adders for adding the distance metric for each possible branch to a

6   previously accumulated path metric to produce a revised path metric for each branch;

7   at least one comparator for comparing the revised path metric for a plurality of

8   branches; and

9   a selector for selecting a path metric for a path having a smallest path metric.

1   32.   The data storage system of claim 31, wherein the at least one comparator

2   includes a threshold for making a bias adjustment to improve detection reliability in the

3   presence of data dependent noise.

1   33.   The data storage system of claim 32, wherein the threshold is adjusted to

2   choose a sequence with more transitions.

1   34.   The data storage system of claim 32, wherein the threshold is adjusted to

2   choose a sequence that compensates for polarity dependent noise.

1   35.   The data storage system of claim 34, wherein the threshold is adjusted to

2   choose a sequence with more ones when polarity dependent noise makes ones more

3   noisy.

1   36.   The data storage system of claim 34, wherein the threshold is adjusted to

2   choose a sequence with more zeroes when polarity dependent noise makes zeroes more

3   noisy.

1   37.   The data storage system of claim 29, wherein the sequence selection stage

2   further comprises:

3   a plurality of error event filters, operatively coupled to the Viterbi decoder, for

4   identifying an error event and producing an output error;

5   a plurality of adders, coupled to the error event filters, for combining the output

6   error with an offset term specific for each error event filter to produce an error sequence;

7   and

8   a selector for deciding on one error sequence from the plurality of adders.

1   38.   The data storage system of claim 37, wherein each of the offset terms

2   comprise a threshold, each of the thresholds being adjusted to improve detection

3   reliability in the presence of data dependent noise.

1   39.   The data storage system of claim 38, wherein the offset terms comprising

2   a threshold are made dependent upon the sequence at the output of the Viterbi decoder.

1   40.   The data storage system of claim 39, wherein the offset terms comprising

2   a threshold are adjusted to choose a sequence with more transitions.

1   41.   The data storage system of claim 39, wherein the threshold is adjusted to

2   choose a sequence that compensates for polarity dependent noise.

1   42.   The data storage system of claim 41, wherein the threshold is adjusted to

2   choose a sequence with more ones when polarity dependent noise makes ones more

3   noisy.

1   43.   The data storage system of claim 41, wherein the threshold is adjusted to

2   choose a sequence with more zeroes when polarity dependent noise makes zeroes more

3   noisy.

1   44.   A read channel, comprising:

2   means for decoding a received data stream to produce an estimated sequence

3   representing decoded data bits; and

4   means for analyzing error events and selecting a sequence based upon the analysis

5   of the error events;

6   wherein the means for analyzing error events and the means for decoding each

7   include at least one threshold, and wherein at least one of the threshold of the means for

8   analyzing error events and the means for decoding is dynamically biased to improve

9   detection reliability in the presence of data dependent noise.